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QUANTUM MIND AND SOCIAL SCIENCE: UNIFYING PHYSICAL AND SOCIAL ONTOLOGY

Principal Investigator: Alexander Wendt, Ralph D. Mershon Professor of International Security

Alexander Wendt is perhaps best known for his 1999 book, *Social Theory of International Politics*. Winner of Best Book of the Decade Award from the International Studies Association, the book essentially brought the constructivist school of thought into the field of international relations.

Now, more than 15 years later, Wendt has published a second book, *Quantum Mind and Social Science: Unifying Physical and Social Ontology*. This book is a substantial departure from the first. In this interview, Wendt answers questions about how his new book applies the philosophy of quantum mechanics to social science.

Question (Q): What gave you the idea of applying quantum mechanics to social science in the first place, and what made you think you could do it?

Alex Wendt (W): Well, I had recently finished my first book in 1999, and I was looking around for something new to do -- in terms of my own intellectual situation, I was sort of casting about. I knew there were problems in the book -- I wasn't satisfied with my resolution of various issues -- so in that sense I was motivated to find something that would speak to those problems.

It was really sheer coincidence that I was in a bookstore in Chicago and came across a book called *The Quantum Society* by Danah Zohar and Ian Marshall (Morrow, 1995), which was a non-academic book, but basically makes the argument that I make in my new book, which is that the brain and society are quantum phenomena.

So I read this book, and I thought, "Wow! This could be it." Then the more I followed up on their citations and read about the ideas, the more I became convinced that the argument was true. So I decided that I wanted to write a book for a more academic audience where this would get taken more seriously.

So that was how it came to be. The book took a lot longer to write than I expected. I had to teach myself a lot of stuff, and it was just a very hard book to write, but it finally got done.

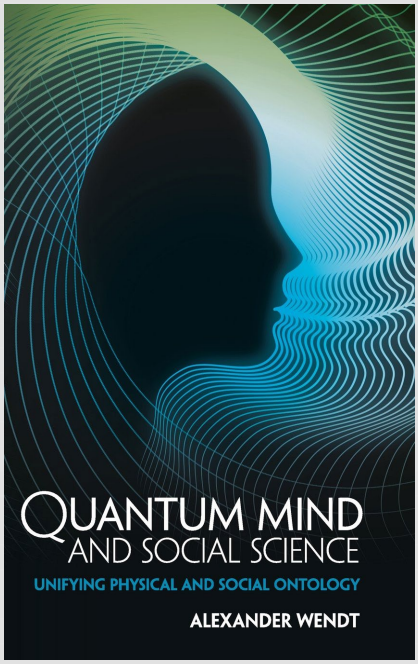
Q: You started on it when?

W: 2001.

Q: That did take a long time.

W: Yeah.

Q: From reading some of the reviews of the book, it sounds like there are various theories of quantum mechanics, and the physicists argue among each other, and that you took one side or one aspect of that and ran with it. Can you give us a brief rundown of that?



W: Well, the actual theory of quantum physics, there's no disagreement about. There's just one quantum theory and physicists use it all the time to make predictions, and the predictions are always true. So it's actually considered the most well-tested and most accurate theory known to man.

What's at issue is how to interpret the theory -- what the theory is telling us about the nature of reality -- because the theory is so bizarre, and its predictions are so counterintuitive that it's not at all clear what it means. So that's what the debate is about. There are at least a dozen of these interpretations, and they've been around 80 years, all of them, basically, or most of them. And since they're all trying to make sense of the same facts, what we observe in the laboratory, they don't disagree empirically, nor do they disagree about quantum theory per se. What they disagree about is its philosophical implications about reality.

Now it is true that my argument in the book favors some interpretations over others, but that's a result of the argument I make in the book, rather than the starting point. In particular, it's because I'm interested in consciousness and where it comes from, and then my explanation for that ends up favoring certain interpretations of quantum mechanics over others. But I'm not trying to weigh in on the debate among the physicists. My audience is social scientists and philosophers of social science.

Q: So that leads to the next question. What is your "quantum model of man"? Is there a way to explain that?

W: I think the best way to think about it is in opposition to the standard, classical model. The orthodox view has always been that human beings are classical mechanical phenomena, which means that the laws of physics apply as Newton and his successors in the 18th and 19th centuries understood them. They thought the laws of classical physics should adequately describe and explain human beings and human behavior.

Classical physics makes a lot of assumptions about the nature of reality. It assumes that all objects have well-defined properties, so they can't be in contradictory states at the same time. It assumes that causation, the way things happen causally in the world, is through the transfer of energy or contact -- so "a" hits "b," and "b" ricochets off into the distance.

It assumes that human beings are completely separate individuals, so we're each encased in a body with a skin, and you can totally separate each of us physically from each other -- including our minds, because our minds are dependent, in the classical view, totally on our brains, and the brains are inside our skins, and therefore they're completely separate. So it leads to a very atomistic picture of society in which each of us is an atom in society.

But in quantum mechanics all these assumptions, at least at the subatomic level, break down. Subatomic phenomena don't have definite properties. They can have contradictory properties, or "x" and "not-x" at the same time, or they can be indefinite in their characteristics. You can have what's called non-local causation, where things can influence other things far far away instantaneously. And most interestingly, subatomic systems can be what's called entangled, which means that they can't be defined separate from each other -- they're not completely separable in a physical sense.

So at the sub-atomic level it's a holistic world versus an atomistic one, which is really different than what happens at the macroscopic level. The big question for the physicists is what explains the transition from all this sub-atomic weirdness to what we observe classically, such as this stapler hitting this table – which is a classical phenomenon.

So my answer in the book is that, at least when it comes to living creatures -- and human beings specifically -- that the properties of sub-atomic systems 'scale up" to the macroscopic level, and so we are not classical systems at all. We are giant subatomic ones or what I call "walking wave functions." We have all the same characteristics that quantum systems have sub-atomically -- we're non-separable, our brains can be in contradictory states at the same time, and so on.

The interesting thing part of this for me is the non-separable idea, the entanglement notion. The idea there is that even though our bodies are encased in skins and are separate from each other, our minds are entangled through language, and that language, I argue, is a quantum phenomenon that entangles our minds together.

A good example of this, I think, is something that's been widely remarked upon in the social sciences, the master-slave relationship. You can't be a master unless you have a slave. That to me is entanglement. It means that the properties of the master cannot be defined except in relation to the properties of the slave, so they're not completely separable.

In classical physics you should be able to say everything there is to say about being a master as a function of the master's body, and the slave is over there. But in the quantum world, you can't define where one thing is without defining its relationship to the other thing. That very common-sense example, I argue, is an example of quantum entanglement through language, the language

that defines what a master is and what a slave is.

Q: So do the master and slave have to speak the same language?

W: That's a good question, and actually I address that briefly in the book. The example I give is, if a Vietnamese tourist is hanging out in Denmark and goes into a shop, and if the shopkeeper doesn't speak Vietnamese and the tourist doesn't speak Danish, then their minds cannot become entangled except at a very primitive level, the same way your mind would be entangled with the mind of an ape, let's say, through vision, because vision also entangles people.

But, if the Vietnamese guy says, "Do you speak English?" and the Danish shopkeeper says "Yes!" then all of a sudden, they both can speak English, and now their minds are suddenly entangled and they know way more about each other now, instantly, and what they can communicate, than they did before. So it is important to be able to speak the same language, yes.

Q: So how would this apply to animals, and creatures other than humans? Because if they have minds, and we have minds, it seems like often you can read their behavior or almost read what they're thinking, even though there's no language going back and forth.

W: That's true, because it's not just humans that are quantum systems, but all living beings are, and actually the field of quantum biology is now exploding. Just within the past five years they've discovered that plants use quantum effects in photosynthesis, that birds use quantum effects in navigation, and in various other organisms they're finding all kinds of quantum stuff going on. This discipline is still in its infancy, but my impression is it's really taking off. And that, I think, strongly supports the argument that if birds can do it, and plants can do it, and bees can do it, chances are that people can do it too.

So I think all living systems are quantum systems, but it is true that we're the only ones that have language. Now maybe honey bees have their own special language -- they do the honey bee "dance" to communicate, for example -- and there may be other forms of communication we don't understand, and that would be interesting to explore. But even visually, I think there is a quantum connection between any two animals, whether of the same species or not, and that establishes the quantum entanglement immediately. Apparently the retina of the human eye is so sensitive that it can detect a single photon, and the photon is a subatomic particle. So that's an extraordinary level of sensitivity, and suggests again that we have quantum characteristics and not just classical ones.

C. So all this that we are talking about is in physical and biological science, but how does it matter for social science?

W: Two things I would say. One is that for at least a century now, social scientists have been arguing about, "How do we deal with meaning, consciousness, intentionality, all these things that don't seem material?" You have the positivists saying, "It's no big problem. We can do science, just like geologists can do science. We can basically ignore meaning, we can ignore consciousness." And then you have the anti-positivists, or so-called interpretivists, saying, "No, no, no, meaning is everything, and we've got to study meaning, we've got to think about consciousness."

So this disagreement has existed for over a century. It's a completely stagnant debate, not going anywhere, because the underlying problem is that we don't have an explanation for consciousness. This is the mind-body problem, which is really the starting point for the whole book.

Or more precisely, we have no classical explanation for consciousness, but from a quantum perspective, there is the possibility that quantum consciousness theory is true and that leads into a very different view of the mind than the classical view. The classical view sees human beings as machines, walking computers essentially, and it takes a very atomistic approach. So you have these machines that are processing information, looking at each other in this very atomistic way, and that's mainstream social science. But a quantum perspective suggests we're not just machines -- we're actually alive. Personally, I believe that I'm alive, and that's different than just being a machine, and it's not atomistic at all, it's holistic, and we're entangled.

Now if your starting premise for thinking about social life is atomistic, then conflict is the natural starting point for life -- every organism is out for itself, they're all selfish, it's all about survival of the fittest. Cooperation is very difficult because we're all separate and all trying to survive and do our own thing. On the other hand, if your starting point is holistic, where everything's entangled, then cooperation may be much easier to achieve. It may even be the default situation, and conflict is the exception. So it turns upside down a lot of the foundational assumptions, I think, of mainstream social science.

One of the key chapters in the book (Eight) is where I review this literature that has really taken off in the past 10 years called quantum decision theory, which has basically been put together by mathematical psychologists and physicists working together. In psychology it is well known -- has been known for decades through experiments -- that if you model human beings in classical terms, then they do not behave very rationally in many different settings. This has always been treated as an anomaly, like it just means people are irrational. But there is no widely accepted theory of why this is the case, why people behave this way. It's just viewed as unfortunate.

Quantum decision theorists have come along, and what they've done is they've used the quantum formalism, basically quantum mechanics, to model human behavior. And when you do that, it turns out that all this irrational behavior that's seen as anomalous otherwise, is actually what is predicted. So if you "quantize" people and their behavior, you actually predict the things that are otherwise completely unexpected from a classical perspective.

To me, that is extraordinarily powerful evidence that human beings are quantum systems, because -- and the way I put it in the

book is -- I can't think of any example in the history of social science where one theory has explained so much that was so puzzling before. And now there's also quantum game theory, which again, treats people in games as if they're quantum systems, and again, there are a lot of long-standing experimental results that don't match up with what classical game theory predicts, but quantum game theory seems to predict those results.

So it's just like what happened in physics 100 years ago. You had all these anomalies building up that classical physics had generated, that weren't supposed to be there, and quantum mechanics came along and explained all of them. So I think it's a very analogous situation, and again that's powerful evidence of my view that human beings really are quantum systems.

Q: So when classical theorists say someone does something irrational, are they saying that what that person is doing is not in his or her interest? For example, if I choose in a game to share rather than to try to hoard, would classical theory see that as irrational because it's not in my interest, but quantum theory would predict it because it shows that people are connected?

W: Yes. The standard example is the Prisoner's Dilemma, which is the most famous game in social science. If you play Prisoner's Dilemma just one time, the rational thing to do is not cooperate. But it turns out, in experiments human beings cooperate about half the time when they play this game. From a classical perspective, that's completely irrational, it's not expected, it's an anomaly. In contrast, quantum game theory predicts such behavior, and sure enough, that's what we see.

Q: So what would the mechanism for that be? Is the mechanism that I would cooperate because I am thinking about what my partner in crime, who's in a different room, is thinking, so my mind is kind of placing itself in their mind, thinking what they would do? So then I cooperate because I am thinking they would probably cooperate?

W: Well, I think a classical game theorist would say the same thing you just said -- that the two prisoners in the two cells, or two different players in any game, are trying to anticipate the other person's moves and then trying to do the best they can, figuring that's what the other person is going to do. That's true of all game theory, not just quantum.

The difference in quantum game theory is that there's some notion of that the players are entangled. They're not completely separate any more. They speak the same language, and because they speak the same language and they've all been civilized to the same norms, so they behave differently than they would in the classical situation. So it's not just putting yourself in the head of the other. It's that in a sense, your minds are not even completely separate anymore. You're really one mind if you speak the same language and have a relationship.

Q: So would that help explain why humans tend to see different cultures as "other," because they are not, on a quantum level, as connected, because they speak a different language and have been brought up differently?

W: Yes, I think that's probably right. I don't explore that in the book, but I think that would be a natural inference to make. And it might be partly about language and partly about something I've been interested in for a long time but have never really explored which is, what difference does speaking a different language make to the likelihood of going to war with somebody?

I've always felt like if you speak the same language, it's going to be harder to go to war. Now of course, we have civil wars among people who speak the same language -- although probably most civil wars are between different ethnic groups that speak different languages. And of course in a lot of interstate wars the other guys speak a different language. So, I think that being able to speak the same language, having the same culture, same kind of historical past, those are all things that bind people together. And if you don't have that, then it's much easier to "other" the other side, to treat them as nonhuman or as somebody that you can kill.

Q: Is that one way this would be applied directly to international relations?

W: Yes, I think so. I don't do that in the book, but I think that explaining conflict and cooperation would be the natural place to start applying this reasoning to IR. And actually, my IR colleagues Bear Braumoeller and Chris Gelpi, along with Jakub Tesar, a pre-doc who's visiting from the Czech Republic who does quantum game theory -- are thinking about writing an article together that tries to show the relevance of all this for political science and IR.

The idea is to bring together game theory and political psychology, and to show that we can unify game theory with what political psychologists have found, if we do it on a quantum basis -- because otherwise, the political psych people and the game theorists never talk to each other. The political psychologists think game theorists don't know what they're doing because people don't behave that way in real life, and the game theorists say the political psychologists don't have a theory, they just have experimental results. And we come along and are going to say, "We've got a theory and we can explain what the political psychologists have found." At least that's the idea of the paper, but we're just getting started.

Q: Okay. Are there other ways this can be applied to IR?

W: I'm sure there are. You know, there are a lot of IR scholars for a long time who have talked about the state as if it were an actor, as if the state is a person -- China does this, China is rational, China has certain interests or certain beliefs. And usually that kind of talk is seen as a metaphor. China is not really a person, right?

I've actually published on this question before, in my pre-quantum days, and in the book I try to make the case that states actually are super-organisms like an insect colony or a bee hive, and that they even may have a kind of collective consciousness. That's where the book ends, and it's the most speculative part of the book, and the part that I'm still not sure I believe myself. But it

seems to be where the argument leads, and so I try to make the case that countries, states, and other collectivities are super-organisms with collective consciousness. Now that's really out there, and you can buy a lot of the rest of the book without buying that, I think. But I figured I would just push the argument to the limit and leave it at that.

Q: That could also support the notion that corporations are persons, which is highly disputed right now.

W: Yes, it would, but it doesn't mean that the individuals who run the corporations are unimportant. They may still be crucial.

I actually have a metaphor of society as a hologram. If aliens were looking down from space, they wouldn't see states. They would just see a bunch of individuals running around. So society and states are invisible, and the only way to actually see the United States or Canada is to get inside the minds of Canadians and Americans or people who know that those things exist.

And so the idea is that this ability to see Canada or America is holographic. In a typical photograph, if you cut the photograph in half, you lose half the picture. But in a hologram, if you cut the hologram in half, you still have the whole picture -- it's just a bit fuzzier, because each pixel in the hologram encodes the whole thing, the whole image, unlike in a traditional photograph.

So encoded in each American citizen is an idea of America as a whole. And so if you killed off 90 percent of the American population, America would still survive because you'd have that 10 percent who know what it is to be an American, know what American law is and what our institutions are, because all that information is encoded in each of those individual citizens. So each of us acts as a pixel in the hologram of America.

And so, going back to the point about corporations being persons, each individual member of the corporation is a pixel in the corporation, and is therefore in some way responsible, because each pixel contributes to the whole, especially the leaders. But there is something larger above the individuals, namely the corporation as a whole that has its own stand.

Q: How would you say *Quantum Mind and Social Science* picks up from your first book, *Social Theory of International Politics*?

W: Well, the previous book is unwittingly classical in its framing of social life. It assumes a classical physics background. And so because of that, that book inherits all the problems that the social sciences have always had, like what do we do with consciousness? What do we do with meaning? How do we put these together with material reality? Individuals are separate, so how do we get social wholes out of that? And so the book implicitly rests on the same foundation that all social science does, and therefore inherits all the problems.

The new book completely changes the foundations of social science, and in so doing it rescues some of the arguments of the first book. It gives them a better philosophical basis, but it also would end up changing some of the arguments too, I think.

Q: What kind of splash do you think *Quantum Mind* is going to make in the field? Will a lot of people go "Ah ha!" and start looking at things in a quantum way? Or will they just go, "Okay, that's interesting," and move on?

W: I think if it takes off at all, it's going to be a slow process, a slow burn. My first book landed after a lot of people had already done a lot of work on constructivism, including me and many others, so constructivist ideas were out there in the field. Everyone was kind of waiting for the book, the book hit, and it was a big success. I was very lucky.

But this book is coming out of nowhere. There's no preparation for it in the field, no one is waiting for a book on quantum social science. I didn't write any articles about it because it was too hard to write an article about it. So I think a lot of people in IR will read this and say, "Wendt has gone off the deep end. This is insane, this is crazy."

But I think as people pick up on the quantum decision theory stuff, they'll begin to see how powerful that technique is. And if they do that, then it's just a logical train of thought to end up where I'm at, but it may take them a while to get there.

On the other hand, unlike my first book which was read only within IR, this one is being reviewed in geography, sociology and hopefully philosophy journals, so it may have a more interdisciplinary reception. In fact some of the people who are most enthusiastic – based on emails that I have received about it are not political scientists at all, but in other disciplines. So I think it's going to take a while, and it may not ever take off. The first book was and still is a textbook in many graduate courses. I doubt this will ever be a textbook.

But I will say that this is the first thing I've written in my 25-year career that I think is either true or false. I don't think in most IR, most political science, we would use that language. We're all making arguments and trying to make the best argument we can, but one would never say one's argument is either true or false. But this one is -- either people have quantum minds or they don't have quantum minds, and if they do, then the book is revolutionary, even if takes 10 to 20 years for people to figure that out. If we don't have quantum minds, I hope that at least we'll have a very interesting discussion about why we don't, and then people will conclude that the argument is wrong. So hopefully either way it will make a splash, but it's going to take a while, I think.

Q: Do you see yourself offering a course in this for grad students?

W: I am offering a course next year, a 5000-level grad-undergrad mixed class on quantum social science, and the book will be the textbook basically, and then we'll read other stuff on the side. I don't know if anybody will take it. There's no requirement to take it, and few incentives, but hopefully I'll get enough students interested that I'll at least be able to offer it.

If the course is a success, then what I would like to do down the road, if we can find enough people on campus, is to create an interdisciplinary program on quantum social science. So there would be a methods track where they would learn all the math, there'd be the philosophical track, there'd be the experimental-empirical track, and eventually you create a whole program where students would be trained this way from the beginning. That's a five-year proposition, but from an institutional perspective, I think that's what's required.

Q: Are there other institutions that might be farther along other than Ohio State?

W: No, to my knowledge no one is doing this yet, so we would be the leaders. There are individuals here and at many institutions who do this stuff, but what has not happened is bringing together a critical mass of people from different disciplines into the same program where you would admit graduate students, or undergrads for that matter, and train them this way.

But that's complicated by the fact that when grad students learn methods, they learn probability theory and game theory, but they're learning classical probability theory, classical game theory. And in quantum probability theory, the rules are all different. I've had game theory colleagues in the past, and when I've shown them quantum game theory, they were unable to read the math because they were never trained to read quantum mechanics, and the math is totally different.

So it would require retraining graduate students in new methods for this to really be explored empirically, and that's a huge proposition. I can't imagine getting my political science colleagues to agree to revamp the methods sequence to teach quantum probability theory -- although I am raising the question at faculty meetings of, "Why aren't you guys teaching this stuff? Because it actually predicts human behavior better than your classical probability theory." But so far they haven't offered a good answer. They just say, "That's how we've always done it."

Q: I could see a journal coming out of this, especially if there are people at different universities who do this work.

W: Yes, I have thought about a journal, called Quantum Social Science. I co-founded one journal 10 years ago, which was much more time consuming than I expected. But my time on that journal will end soon, so I'll be freed up, if I want to, to try to found another one. I don't know if there's enough demand out there yet, or enough supply of manuscripts to sustain a journal in quantum social science, but there's a lot of work being done now that could fit under that heading.

Q: Is there anything else I haven't covered?

W: I guess it would be that I encourage people to buy the book. It's not expensive -- Cambridge priced it very low because they're trying to reach a broad audience. See for yourself. It's very speculative, but I make the case -- actually this is one of my favorite lines in the book -- that the argument is "too elegant not to be true." So I would encourage people to just check it out and make up their own minds, rather than taking the standard view that "it can't be true therefore it isn't."

Q: I can imagine how hard it was to write because you're pulling everything together.

W: Right, it was a huge synthesis. I had to teach myself philosophy of quantum mechanics, philosophy of biology, philosophy of mind, philosophy of language, a little bit anyway of each of these different disciplines. So it was a huge endeavor, but it was so much fun to write the book. You know, it was hard, but it was fun because the ideas are just very exciting. And of course I became a true believer, so now it's a matter of personal conviction.

And this is what tenure is for -- I really think that. Some people at my stage of career, they just keep repeating the things that made them famous when they were younger, and they keep defending those arguments against the new generations that come along and try to upend them. And that's fine -- that's the standard career path for academics.

But I was bored of constructivism, and I didn't really want to defend it against the criticisms that kept coming in. I knew there were problems in constructivism all along, and I think I've solved them now.

You know the old Monty Python skit, "And Now for Something Completely Different" – well, this is something completely different. I wanted to retool myself basically, and have another career intellectually.

That just makes my life much more fun as an academic, and this is what being an academic is for, at least for me. I feel like my role as a tenured, full professor is to say something that isn't obvious, that somebody else wouldn't say, or that a junior person couldn't say because of the professional incentives against them. I have the luxury of being able to say whatever I want, and I feel like I have a responsibility to go out on a limb and say something provocative.

Maybe the argument that human beings are walking wave functions is wrong. Okay, that's fine. It will still be useful to prove that it's wrong, because the question has never been debated before. The classical assumption of social science has never been called into question, so at least now there's a question mark around something that had always been taken for granted. And so if my argument ends up being wrong, at least we'll then have a better defense of that classical assumption. And who knows, maybe the argument will turn out to be right! Either way it seems like it would be a useful discussion to have.

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